

NOTES ON THE CLUSIACEAE - CHIEFLY OF PANAMA. III.

Bassett Maguire¹

The present, Part III, concludes the series of notes in report on a preliminary review of Panama Clusiaceae which had been sent to me by the preparators of Flora of Panama. Part III presents reports on nine species of Clusia, six of them proposed as new. My own Clusia salvinii var cupulata is elevated to specific status. Tovomita morii is also here submitted following a review of its close Amazonian and Guianan relatives, the members of the T. macrophylla-complex. As a result of the indicated brief review a further name, Tovomita froesii, to be assigned to the complex is required.

1. Clusia divaricata Maguire, sp nov

Sectione Euclusia Engl. dubie assignata.

Arbor parva ad 15 m alta vel scandens; latice albido moderato; ramulis teretibus; foliis valde petiolatis, petiolo vulgo 3-5 cm longo, fovea petioli non-conspicua; laminis oblongo-ellipticis vulgo 15-25 cm longis, 8-12 cm latis, abrupte acuminate, venis lateralibus inconspicuis, adscendentibus 10°-15° angulo; inflorescentiis terminalibus, plurifloribus; masculinis: racemi-cymosis, vulgo 15-25 cm longis, bracteis naviculi-acutis, ramis divaricatis, cymosis, vulgo 3-floribus, conspicue bracteatis, floribus saepe nectantibus; sepalis 4, decussatis, late rotundatis, 6-8 mm longis, vittatis, marginatis; petalis 6-8, late oblanceolatis, ca 3 cm longis, valde vittatis, marginibus aliquantum irregulariter crenatis, roseo-albidis; receptaculo plano, staminibus fertilibus, 3-4-serialibus, in brevi corona portatis; filamentis ca 1.5 mm longis; antheris linearibus, 2.0-2.5 mm longis, mucrone ca 0.5 mm longo instructis, 4-theclatis, lateraliter dehiscentibus; granis pollinis sphaeroideis, triplicoratis, ca 20-25 u diam, exinio subtiliter rugulato-reticulato; intus staminodiis numerosis, liberis, linearibus, sessilibus, ca 3 mm longis, sterilibus; inflorescentiis foemineis vulgo 6-12 cm longis, bracteis conspicuis, ramis divaricatis, vulgo unifloribus; sepalis 4, depresso-rotundatis, concavis, ad 12 mm latis, scarior-marginatis; petalis 6-8; staminodiis compressis, 2-3 mm longis, 2-serialibus, in brevi corona instructis; ovario 10-12-locularibus; fructibus apparenter obovatis, stylis brevi-conicis, stigmatibus sessilibus; ovulis multis, seminibus

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ignotis.

Type. Small or subscandent tree with whitish latex, petals white, occasional, margins of high bush, La Mesa, 6 km above El Valle, ca 600 m alt, Prov. Coclé, Panama, 18 Jan 1975, Bassett Maguire & Yung-chau Huang 65521 (holotype NY).

Distribution. Small trees to 15 m high, usually at margins of woodland, frequent at 600-1200 m alt, Coclé, Panamá, and Veraguas provinces, Panama.

PANAMA. Prov. Coclé: terrestrial laticiferous tree, fruits green, in this *Clusia* there are at least 4 leaf types of *Clusia* and 2 fruit types, in cloud forest on slopes of Cerro Pilon near El Valle, 700-900 m alt, 10 Jun 1967, Duke 12086 (NY); small tree 8 m high, ♂, latex moderate, white, sepals 2 pairs, white, pedicel white, petals white, ca 2.5 cm long, La Mesa, Cerro Gaital, 3 mi NW of El Valle, 9 Nov 1967, Maguire & Maguire 61492 (NY); ♂, small tree 8 m high, latex moderate, white, sepals 2 pairs, white, pedicel white, petals white, ca 2.5 cm long, La Mesa, Cerro Gaital, 3 mi NW of El Valle, 9 Nov 1967, Maguire & Maguire 61493 (NY, unicate); shrub, fruits green, "Copey," cloud forest, 3000 ft elev, Cerro Pilon, El Valle, 4 Jan 1968, Duke & Lallathin 15024 (MO); Cerro Pilon, ca 2900 ft elev, Apr 1968, Lallathin 36-3 (MO); tree or epiphyte to 6 m, dbh 13 cm, leaves leathery, fruit green, latex yellow, El Valle site area of WEPOR, Cerro Pilon, 24 Apr 1968, Kirkbride 1059 (NY, MO); small tree, buds white, Cerro Pilon, foot of thicket near Mr. Furlong's farm, 11 Jan 1972, Gentry & Dwyer 3626 (MO, 2 sheets); epiphytic shrub, flowers white, hills above El Valle, tropical wet forest, ca 1000 m alt, 24 Dec 1972, Gentry 6905 (MO); tree, lactiferous, buds and petals white, La Mesa, 2200 ft alt, 4 Jan 1974, Dwyer & Nee 11945 (MO); petals white, cut-over cloud forest along farmer's road, ca 3 km NE of El Valle, 2 Nov 1974, Mori & Kallunki 2971 (MO); small or subscandent ♂ tree with whitish latex, petals white, occasional, margins of high bush, La Mesa, 6 km above El Valle, 18 Jan 1975, Maguire & Huang 65521 (holotype NY); small or subscandent ♀ tree with whitish latex, petals white, occasional, margins of high bush, La Mesa, 6 km above El Valle, 18 Jan 1975, Maguire & Huang 65522 (NY); small ♂ tree with whitish latex, petals white, occasional in margins of high bush, 7 km above El Valle from La Mesa, 18 Jan 1975, Maguire & Huang 65525 (NY). Prov. Panamá: tree 10 m, flowers pinkish-white, fragrant, Cerro Campana, 800 m alt, 7 Jan 1947, Allen 3960 (NY, MO); tree 15 m, fruits green, Cerro Campana, 800-1000 m alt, 3 Apr 1972, Gentry 4912 (NY, MO); tree 4.5 m tall, 8 cm dbh, petals white, along trail to top of Cerro Campana, 13 Oct 1974, Mori & Kallunki 2470 (MO). Prov. Veraguas: sap pale turning orange, small tree 2 m, 3.5-4.5 mi above Santa Fe, 13 Dec 1971, Gentry 3072 (MO); 5 m high, 5 cm dap, Alto Piedra

Santa Fe, 1200 m elev, 26 Enero 1972, Lao & Maasola 481 (MO).

Because of the morphology of the staminate flower, one is led to assign Clusia divaricata to the broader section of Euclusia as amplified by Engler². It remains clear, however, that sectional content and limitation within the genus must be reconsidered.

2. Clusia dukei Maguire, sp nov

Sectione non-designata.

Epiphytica vel arbor facultativa; ramulis teretibus, foliis petiolatis, petiolis tenuibus, 12-15 mm longis; laminis ellipticis, basibus et apicibus acutis vel acuminatis, vulgo 6-10 cm longis, vulgo 2-4 cm latis, papyraceis; venis lateralibus inconspicuis, ca 1.5-2.0 mm apartis; inflorescentiis evidentibus, vulgo unifloribus interdum trifloribus; floribus masculinis non bene cognitis: alabastris ca 5-6 mm diam, sepalis apparenter 4, decussatis; petalis non visis, staminibus numerosis, liberis, filamentis crassis, ca 1 mm longis, connectivo crasso, antheris lateralibus dehiscentibus, ca 2 mm longis; pollinibus subsphaeroideis, tricolporatis, minutis, ca 14-16 μ diam; inflorescentiis foemineis apparenter unifloribus: alabastris parvis, sepalis 4, floribus non-visis; fructibus elongato-oblongis, vulgo 4-6 cm longis, 2.0-2.5 cm latis, apice aliquantum sulcato-cornuto; stigmatibus 8, lateraliter affixis, aliquantum 5 per coalitis; ovario vulgo 8-loculari, multi-ovularibus; seminibus ca 4 mm longis.

Type. Epiphytic liana, fruits green, on Chiriqui Trail, cloud forest between Quebrada Hondo and Divide, Prov. Chiriquí, Panama, 20 Apr 1968, Joseph H. Kirkbride, Jr. & James A. Duke 958 (holotype MO).

Distribution. Localized in the cloud forests of the Horquete region of the Cordillera Central, Province of Chiriqué.

PANAMA. Prov. Chiriqué: tree 6 m, very common, Llano del Volcán, 1500 m alt, 27 May 1946, Allen 3503 (NY, MO); epiphytic, cruciately branching liana, latex scanty, sepals imbricate, green, fruit green, oblong, to 4 cm long, premontane rain forest between Pinola and Quebrada Hondo toward summit on Chiriquí Trail, 20 Apr 1968, Kirkbride & Duke 893 (MO, NY); epiphyte,

buds green, flowers tan-brown, tetramerous, caducous, mature fruit green with brown verrucae, ca 2 cm diam, on Chiriquí Trail, cloud forest between Quebrada Hondo and Divide, 20 Apr 1968, Kirkbride & Duke 931 (MO); epiphytic liana, fruits green, on Chiriquí Trail, cloud forest between Quebrada Hondo and Divide, 20 Apr 1968, Kirkbride & Duke 958 (holotype MO, isotype MO, NY).

3. Clusia erectistigma Maguire, sp nov

Frutex epiphyticus, plus saepe magnus; foliis chartaceis; petiolis tenuibus, 1.5-2.0 cm longis; laminis oblanceolatis, vulgo 10-15 cm longis, 4-7 cm latis, apicibus rotundatis, vel abrupte breviter obtuse acuminatis; basibus anguste acuminatis; venis primariis ca 3-4 mm apartis, ca 60° adscendentibus; inflorescentiis terminalibus, vulgo 3-5-floribus, ad 10 cm longis; pedicellis conspicue bracteatis; sepalis subpetaloideis, 3-jugis, late semi-orbicularibus, ad 12 mm latis, 8 mm longis, marginatis, interioribus late oblongis, ad 12 mm longis; petalis 5-6, panduriformibus, roseis, obovatis, 2.2-2.6 cm longis, vittatis; discis androecialibus anantheris, glutinosis; ovario 8-10-locularibus, multiovulatis, ovulis axialibus (lateraliter extensis); stigmatibus 8-10; fructibus ca 3.5 cm longis, late ovati-ovalibus, stigmatibus erectis introrsis, late oblongis, aliquantum truncatis, 3-4 mm longis, ca 2 mm latis; seminibus anguste oblongis, 4-5 mm longis, ca 1.5 mm latis, longitudinaliter punctato-striatis, carnosomembranaceo-arillatis; inflorescentiis masculinis recurvatis, vulgo 8-12-floribus; bracteis prominentibus; sepalis 2-jugis, suborbicularibus, coriaceis, ca 6-7 mm longis, marginatis; petalis 5, panduriformibus, unguibus, carminis, laminis carmino-maculatis; androecio viscido compacto; staminibus pluribus columnaribus, plus minusve crassis, antheris plerumque unis vel duobus, circularibus, distalibus immersis; pollinibus sphaeroideis, tricolporatis, ca 25 µ diam; pistillo destitudo.

Type. Massive epiphyte in large tree, latex yellow-brown, moderate, sepals 3 pairs, subpetaloid, white, green-tipped, pedicel white, petals 6, obovate, panduriform, ca 2.5 cm long, 10 mm broad, salmon pink, androecial ring ca 2-3 mm high, anantherous, glutinous, stigmas 9-10, styles initially rotate, at length suberect, Changuinola (United Fruit Company property), Bocas del Toro, Panama, 30 Oct 1967, Bassett Maguire & Celia K. Maguire 61473A (holotype NY). Paratype. In same tree as 61478♂, flowers 5-petaled, petals panduriform, the claw red, the blade red-maculate, common along sea drive ca 5 km from town of Bocas Colon Island, Bocas del Toro, Panama, 1 Nov 1967, Bassett Maguire & Celia K. Maguire 61479 (NY).

Distribution. Massive, apparently obligately epiphytic, Nicaragua to Darién, Panama.

PANAMA. Bocas del Toro: tree with vine-like habit growing around a large bole, Flat Rock, region of Almirante, Jan-Mar 1928, Cooper 562 (NY); Changuinola, 30 Oct 1967, Maguire & Maguire 61473A (holotype NY); fruiting material of 61473A, massive epiphyte in large tree, latex yellow-brown, moderate, Changuinola, 30 Oct 1967, Maguire & Maguire 61473B (NY, 2 sheets); epiphyte in large tree (Sapotaceae), latex yellow-brown, moderate, pedicels white, sepals 3 pairs, white with green tips, petals 5-6, panduriform-ovate, the margins particularly at the claw Chinese red, ca 18-20 mm long, 12-16 mm broad, probably ♂ of 61473, androecium pentagonal, glutinous, inflorescence 1-3-flowered, on United Fruit Company properties in Changuinola, 30 Oct 1967, Maguire & Maguire 61474 (NY); small tree, ♂, latex cream-white, on rocks in salt water spray, Almirante, 31 Oct 1967, Maguire & Maguire 61475 (NY); large epiphyte in mango, ♀, androecium exceedingly glutinous, latex cream-tan, pedicels white, stigmas 8-10, along Carretera Adolfo Chairi, 3 km from town of Bocas, Colon Island, 1 Nov 1967, Maguire & Maguire 61476 (NY); epiphyte, ♂, latex tan-brown, pedicels white, sepals 2 pairs, white with green tips, petals panduriform, ca 2 cm long, 16-18 mm broad, claw marginally red, limb red-maculate towards base, androecium highly glutinous, 5 km from town of Bocas, Colon Island, 1 Nov 1967, Maguire & Maguire 61477 (NY); in same tree as 61478, ♂, flowers 5-petaled, petals panduriform, the claw red, the blade red-maculate, common along sea drive ca 5 km from town of Bocas, Colon Island, 1 Nov 1967, Maguire & Maguire 61479 (paratype NY); epiphyte on sea grape, ♂, petals 4-5, 10 km from town of Bocas, on large crescent beach, Colon Island, 1 Nov 1967, Maguire & Maguire 61480 (NY). Colón: tree growing like strangler fig, buds pale pink, flowers white with red markings, between Río Piedras and Puerto Pilón, roadside, 11 Dec 1967, Lewis, Blackwell, Hawker, Oliver, Robyns & Verhoek 3224 (NY). Darién: small laticiferous epiphytic shrub, fruits green, "Coama" ?, forest near Pidiaque peak, 800-1000 ft alt, 31 Mar 1966, Duke 805 (NY); seems to be close to coll. of Clusia Sr. M.V. Hayden 141 from BCI, epiphyte, flowers white, latex more white than yellow, Río Chucunaque, between Río Membrillo and Río Yaviza, 23 Aug 1966, Duke 8619 (MO); vine which attaches itself to tree, but when grown has branches similar to those of the tree, green fruits with unpleasant scent and taste, vine contains some latex, too green to plant, Uruti River, Duke & Bristan 226 (MO, 2 sheets. Panamá, Canal Zone: along shore west of dock, tree 20 ft tall, Barro Colorado Island, 12 Jul 1960, Ebinger 389 (MO); tree to 40 ft, buds white flushed with pink, dense woods with man-made drainage ditches, Coco Solo, U.S. Army Tropic Test Center, Mine Emplacement Center, 13 Aug 1967, Dwyer & Duke 7913 (NY); shoreline on end of easternmost point of Peña Blanca Peninsula, tree 7 m, fruit green, Barro Colorado Island, 7 May 1968, Croat 5412 (MO).

NICARAGUA. Bluefields: Epiphytic shrub on large sterile Ficus, ♀, flowers 5-parted, pink, ♂ not seen, Finca Santa Rosa, ca 2.5 km ENE of Rama, pastures and old fields, sea level to 150 m alt, Rama and Vic Río Escondido, 5 Apr 1966, Proctor, Jones & Facey 27340 (NY, 2 sheets); epiphytic shrub on large sterile Ficus, ♀ not seen, pastures and old fields, Finca Santa Rosa, ca 2.5 km ENE of Rama, 5 Apr 1966, Proctor, Jones & Facey 27341 (NY, 2 sheets).

Clusia erectistigma is a well marked, conspicuous, widely distributed, massive epiphyte occurring in open places at lower altitudes from Nicaragua to Darién, Panama. For that reason it is amazing to me that records of the plant do not seem to be obviously on the record. It would, therefore, not be surprising to find that I have overlooked a published record of the species. Clusia erectistigma manifestly belongs to the C. minor complex.

4. Clusia cupulata Maguire, stat nov

Clusia salvinii Donn. Sm. var cupulata Maguire, PHYTOLOGIA 38: 212. 1978.

Even with more complete confirmation not yet at hand, and staminate material still lacking, the strong characterization of pistillate specimens requires the elevation of the var cupulata to specific status.

5. Clusia liesneri Maguire, sp nov

Frutex epiphyticus; ramulis tenuibus, teretibus; foliis brevi-petiolatis, petiolis tenuibus ca 1 cm longis; laminis chartaceis, oblanceolatis, vulgo 8-12 cm longis, vulgo 5-6 cm latis, apicibus rotundatis vel aliquantum abrupte brevi-acuminatis, basibus acutis; venis lateralibus prominulis, 60°-70° adscendentibus, vulgo 1.0-1.5 mm apartis; inflorescentiis terminalibus cymosis, masculinis: floribus 25-30, bracteis 1.5-2.0 mm longis, late ovatis; sepalis 6, decussatis, orbiculari-concavis, vix vittatis, in alabastro 5-6 mm longis; petalis 5(6), in alabastro valde vittatis; androecio cum antheris basilaribus, uniseriatis, circularibus, immersis, ca 0.5-0.6 mm longis, staminodiis centralibus, grandis, 6-partitis, plus minusve coalescentibus, vulgo unquoque cum anthera solitaria immersa; granis pollinis immaturis parvis, tricolporatis, plus minusve sphaeroideis, ca 20 µ diam, ut videtur interdum pistillo abortivo centrali; floribus foemineis et fructibus non visis.

Type. Epiphytic shrub, primary forest along newly cut road from El Llano to Carti-Tupile, Continental Divide, to 1 mi from

Divide, at 300-500 m alt, Prov. Panamá, Panama, 30 Mar 1973, R. L. Liesner 1273 (holotype MO).

Distribution. Apparently known only from the type locality. PANAMA. Prov. Panamá: epiphytic shrub, flower buds pinkish, road to Carti [San Blas], 19 km n of El Llano, alt ca 500 m, 13 Mar 1973, Busey 904 (MO, NY); 300-500 m, 30 Mar 1973, Liesner 1273 (holotype MO, isotype NY); buds pink and white, premontane wet forest along El Llano-Carti road, 16-18-1/2 km by road north of Pan American Highway at El Llano, ca 400-450 m alt, 28 Mar 1974, Nee & Tyson 10972 (MO).

Only staminate material of this most interesting, highly distinctive species of Clusia has come to my hands. It is essential to revisit the Cerro Jefe-Llano area for competent observation and collection of Cl. liesneri. Mid- or late-April or May could be a productive period.

Since other insufficiently known and inadequately collected species of the genus are also to be found in the same area, an effective field excursion, or series of them, to this critical area would be most rewarding.

No assignment to section is made at this time, but this plant may be closely allied to Cl. odorata which has a similar androecial apparatus.

6. Clusia minor L. Sp. Pl. 510. 1753.

Type locality. "America meridionali."

Distribution. Epiphytes or shrubs. Central America from tropical Mexico southward; the West Indies; tropical South America to the Guianas, Venezuela and Colombia; probably southward.

The assemblages assigned to C. minor and their immediate putative relatives historically and contemporarily have been and are biologically and taxonomically little understood. Planchon & Triana³, under "Species floribus foem. tantum notis, in

sectione subdubiae" associated Cl. minor with the names Cl. plumieri Pl. & Tr. of Santo Domingo, Cl. odorata Seem. of Panama, and Cl. rosaeflora Pl. & Lind. of Venezuela.

Vesque⁴ some thirty years later also placed Cl. minor in "Species androecei ignoto in sectione subdubiae", p 95, associating this name, as did Planchon & Triana, with Cl. plumieri, Cl. odorata, and Cl. rosaeflora, and added two more, Cl. cartilaginosa attributed to the Dominican Republic, and Cl. parvicapsula, Mexico and Colombia.

Since that time in 1922 Blake⁵ added Clusia utilis, Lake Izabal, Guatemala, to the assemblage listed above.

Recently I⁶ published notes drawing attention to the prevailing condition of apomixis in two complexes going under the names of Clusia rosea and Cl. minor. Of the two, Cl. minor has developed a greater series of phenotypic races, and, besides forming apomictic races, is reproductively more complicated in that in certain forms it produces plants with hermaphrodite flowers, and may also follow the normal dioecious pattern generally prevailing in the genus Clusia.

In this last role Clusia minor is similar in appearance to Cl. odorata, is often confused with it, and may well be inseparable from and be a part of it.

Assigned here to Clusia minor as an apomictic race without a name is a handsome shrub or small tree common at lower to middle altitudes (400-600 m) in the Provinces of Chiriquí, Veraguas, Coclé, Herrera, and Panamá. This race is similar to and may be a part of the apomictic form represented by Cl. utilis Blake of Guatemala. Both have frequently been associated with Cl. odorata.

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DC Monograph. Phanerogam. 8: 95-101. 1893

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Contr. U. S. Nat. Herb. 24: 14, pl 4. 1922.

6

Maguire, B. Apomixis in the Genus Clusia. TAXON 25:
241-244. 1976

Typical collections of it from Panama are: Chiriquí: Boquete, Maguire & Maguire 61470; Citricos, Maguire 60210, 60211; San Felix, Mori & Kallunki 6025; Santa Ana Well, Dwyer & Kirkbride 7459. Coclé: Valle, Dwyer 8364, 8278; Valle, Maguire & Maguire 61507, 61508, 61486, 61491. Veraguas: Santa Fe, Nee 8030 (provided with prominent sterile androecial ring), Nee 10142; Maguire & Huang 65514.

To the north in Nicaragua there is a depressed, small-leaved apomictic shrubby race which acts as a true pioneer on recent lava fields. A broad-leaved form is dominant in upper subxeric slopes of the Venezuelan Andes. A careful field survey throughout its entire range would undoubtedly reveal numerous such apomictic races exhibiting the full range of habit forms. The detection of these races in the field would be much simpler than in the herbaria.

No attempt is here made to resolve the complicated biological and taxonomic problems attendant on the correct and formal assignment of specimens to any apomictic or sexually reproducing races or categories within the Clusia minor-Cl. odorata complex. Any previous such assignment made by me should be held suspect.

7. Clusia oedematopoidea Maguire, sp nov

Liana lignosa; laminis petiolatis, petiolis tenuibus, 2-3 mm longis; laminis pallidis, coriaceis, oblongis, vulgo 10-18 cm longis, 5-8 cm latis, acuminatis, acumene vulgo 10-15 mm longo; nervis primariis improminulis, vulgo 4-6 mm apartis; inflorescentiis multifloribus, terminalibus: masculinis ad 10 cm longis, floribus subglomeratis; sepalis 5-6-jugis, suborbicularibus, interioribus concavis, ad 6 mm longis; petalis non visis; staminibus liberis, introrsis, plus minusve 15-20, filamentis brevibus, ca 0.2 mm longis, stipitato androbasi affixis; antheris oblongis ca 1 mm longis, thecis lateralibus, connectivo prominenti, non-producto; floribus foemineis non-visis; fructibus immaturis, 5-locularibus, lineari-oblongis, ad 3 cm longis, stylis brevioratis, subcornutis, stigmatibus obovato-deltaideis; seminibus non-visis.

Type. Vine, fruits brownish-maroon, Rio Balsa, between Manene and Tusijuanda, 26 Jul 1967, J. A. Duke 13557 (holotype NY), Darién, Panama.

Distribution. Said to be a vine, habitat not indicated, and apparently narrowly restricted.

PANAMA. Prov. Darién: subscandent, Rio Balsa between Rio Areti and Manane, 14 Sept 1966, Duke 8780 (MO, NY); vine, fruits brownish-maroon, Rio Balsa between Manene and Tusijuanda, 26 Jul 1967, Duke 13557 (holotype NY, isotypes MO, NY); vine, buds green, Rio Balsa between Manene and Guayabo, 8 Nov 1967, Duke & Nickerson 14938 (MO); vine, buds cream color, Manene to mouth of Rio Cuasi, 28 Apr 1968, Kirkbride & Bristan 1445 (MO).

A most interesting, well marked species of obviously very narrow endemism, characterized in facies by its form, pale oblong acuminate leaves with broadly spaced improminulous lateral veins, conspicuous inflorescence, oedematopus-like anthers, and narrowly elongate 5-celled capsules. No section is here assigned. More material is needed. Mori & Kallunki 46749, a look-alike but specifically distinct, is for convenience fitted here. Hemiepiphytic liana, in wet forest, 350 m alt, El Llano-Carti Road, 12 km from Inter-American Hwy, 15 Feb 1975, Prov. Panama, Mori, Kallunki & Gentry 4674 (MO).

8. Clusia osseocarpa Maguire, sp nov

Arbor parva vel epiphytica, ad 4 m alta; ramulis teretibus; foliis petiolatis, petiolis 1-4 cm longis, teretibus, foveis petiolarum plus minusve conspicuis; laminis coriaceis, vulgo 6-10 cm longis, 4-12 cm latis, late ovalibus vel suborbiculari-orbicularibus, apice late rotundatis, basibus late obtusis vel abrupte brevi-acutis, venis primariis ad 50° adscendentibus, ca 1.5-3.0 mm apartis; inflorescentiis terminalibus, masculinis non visis; foemineis cymosis, brevibus, ad 3-4 cm longis, congestis; floribus non-visis, alabastris parvis immaturis cum 4 sepalis, decussatis, ca 2 mm longis, concavis, abrupte acutis, bracteis carinatis, acutis; capsulis late ellipsoidalibus, ca 1.5 cm longis, valde 4-porcatis in suturis carpellorum, 4-ocularibus, loculis bispermis; endocarpo prominenter sclero-indurato; stigmatibus 4, parvis, sessilibus, ca 0.5 mm longis; seminibus lineari-oblongis, ca 4 mm longis, 1.5 mm latis, striatis, in sacco membranaceis complete involvis.

Type. Epiphyte, primary forest along newly cut road from El Llano to Carti-Tupile, Continental Divide to 1 mi from Divide, 300-500 m alt, San Blas, Panama, 30 Mar 1973, R. L. Liesner 1285 (holotype MO).

Distribution. Known certainly by the following three collections. PANAMA. Prov. Panamá: east slopes of Cerro Jefe at 2700 ft, in "Clusia" cloud forest, 10 ft tall, 8 Feb 1966, Tyson 3438 (MO, 2 sheets); El Llano-Carti-Tupile Road, Liesner 1285 (holotype MO, isotype NY); tree 7 m tall, 18 cm dbh, young

fruit and buds present, at base of last hill on road to Cerro Jefe, 23 Oct 1974, Mori & Kallunki 2769 (syntype MO).

The three collections, all with mature fruit, present a problem that is not satisfactorily resolved here. The fruit represents the extreme, so far observed within the genus, in the development of endocarp (1.5 mm thick) consisting of sclerenchymatous bony tissue, possibly of stone cells. In the section Omphalanthera, Clusia columnaris and relatives, a similar but thinner endocarp is formed.

9. Clusia rosea Jacquin, Enum. Syst. Pl. 34. 1760.

Distribution. A moderate-sized tree. Central America from Yucatán, Mexico, to the Panama Isthmus; the Greater Antilles.

The type locality of Clusia rosea is the antillean island of Hispaniola⁷, probably the Dominican Republic. There it exhibits two more or less transitory habital forms (Maguire, B. Apomixis in the Genus Clusia (Clusiaceae), TAXON 25: 241-244. 1976), one coastal at sea level, and the other interior and upland. Probably the habital differences reflect immediate environment.

In Panama (and apparently elsewhere in Central America) Cl. rosea is represented by an upland form, a handsome, large, single-boled tree, where it may indeed become one of the largest of the genus.

It may, at some later time when the species is reviewed throughout its Central American-Antillean range, be necessary to review taxo-apomictic forms, but that need does not yet seem to be required.

Distribution. Selected collections. PANAMA. Prov. Chiriquí: 8 Jan 1967, Maguire 60209 (NY); 6 Nov 1967, Maguire & Maguire 61485 (NY). Prov. Coclé: 8 Nov 1967, Maguire & Maguire 61489 (NY); 10 Nov 1967, Maguire & Maguire 61505 (NY). Prov. Veraguas: 16 Jan 1975, Maguire & Huang 65515 (NY).

Howard, R. A. The Enumeratio and Selectarum of Nicolaus von Jacquin. Jour. Arnold Arb. 54: 447. 1973.

10. Tovomita morii Maguire, sp nov

Frutex epiphyticus; ramulis teretibus, grossis; petiolis brevissimis vel foliis subsessilibus; laminis late oblanceolatis, firme chartaceis vel subcoriaceis, vulgo 18-25 cm longis, 10-14 cm latis, apicibus vulgo acutiusculis, basibus acutiusculis vel aliquantum subcordatis, venis primariis prominentibus, lateralibus, 12-18 mm apartis, non-ramosis, ad 45° adscendentibus, venis secundariis transverse subreticulatis; inflorescentiis pauci-floribus, pedicellis demum multo incrassatis; sepalis 4, decussatis, exterioribus interioribus excedentibus et inclusis, ovato-oblongis, 10-12 mm longis, subcoriaceis; petalis non-visis; staminibus 3-serialibus, liberis, linearibus, sublaterali-compressis, 3.5-4.0 mm longis, ca 0.5 mm latis; antheris distaliter lateralibus, ca 1 mm longis; polline non-viso; ovario 5-loculari, ovulis in loculis solitariis, basalter affixis; staminibus 5, obovatis, rotatis; capsulis globosis, 4-5 cm longis, externe conspicue brunneo-verrucosis, oblongis, ca 2 cm latis.

Type Epiphytic shrub? Fruit brown, leaves and fruit with sticky yellow sap, El Llano-Carti Road, 12.7 km from Inter-American Highway, wet forest at 350 m alt, Prov. Panamá, Panama, 15 Feb 1975, S. Mori, J. Kallunki & A. Gentry 4685 (holotype MO, isotype NY).

In addition to the two type specimens, I have before me a single specimen, Busey 370 (MO), also collected in the Carti Road, Km. 15.5, north of El Llano, 13 Feb 1973.

Tovomita morii is a well marked species belonging to the T. macrophylla-T. speciosa-T. calodictyos complex of the Amazon Basin and the Guianas. These names represent a closely inter-related series which requires more study. Our species is distinguished from them by the near sessile leaves and short, subpeltate stigmas.

11. Tovomita froesii Maguire, sp nov

Foliis ellipticis, 25-30 cm longis, 10-15 cm latis, firme chartaceis, apicibus basibusque acutis, venis primariis prominentibus, lateralibus, 12-18 mm apartis, non-ramosis, ad 30-45° adscendentibus; venis secundariis transverse subreticulatis; inflorescentiis non-visis; floribus non-visis; pedicellis incrassatis, brevibus, ca 6 mm longis; fructibus depresso-globularibus, 6-spermis; stylo anguste conico, ad basem valde sulcato.

Type. Shrub 4 m, swampy land, high central forest, Upper Jandiatuba, Estado Amazonia, 12 Jan 1949, R. L. Fróes 23887 (holotype NY). Known only by the type collection.

The relationship of Tovomita froesii lies with the T. macrophylla complex (including Tovomitidium), the members of which are Amazonian or Guianan. Only T. morii, offered above, occupies a disjunct range.

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This brief paper brings to conclusion my preliminary report on some Clusiaceae of Panama. As has been several times expressed in this short series, despite diligent field work, collected material is yet inadequate for a thoughtful understanding of the family in Panama. More specific and correlative field observations must be made in certain critical areas within the country before an adequate interpretation can be made of a number of taxa of the family.

Any further assay into the mid-American floristics of the Clusiaceae would respond more satisfactorily to a comprehensive study of the entire phytogeographically cohesive region.